APPLICATION SERVICE PROVIDER (ASP) ARCHITECTURE FOR PROPERTY MANAGEMENT AND CALL ACCOUNTING

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CROSS-REFERENCE TO RELATED APPLICATION(S)

This application claims the benefit of U.S. provisional application 60/246,990 filed on November 9, 2000, the content of which is incorporated herein by reference.

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BACKGROUND OF THE INVENTION

Hotels typically utilize a property management system (PMS) generally located within a hotel premise network to property manage and bill hotel patrons. For instance, the PMS may manage the check-in and check-out of the patrons as well as bill them for charges, including telephone charges, incurred while staying at the hotel. The PMS typically interacts with a call accounting system (CAS) also located in the hotel premise network to bill the patrons for the telephone charges. The CAS typically includes logic for calculating the cost of completed calls and transmitting the cost information to the PMS for billing.

FIG. 1 is a schematic block diagram of a hotel premise network 10 typically hosted by a hotel. The hotel premise network 10 includes a PMS 12 coupled to a CAS 14 over a serial link 16. The hotel premise network 10 also includes a private branch exchange (PBX) unit 18 coupled to the PMS 12 and the CAS 14 over serial links 20, 22, 24.

The hotel premise network 10 illustrated in FIG. 1 is self-contained in that the property management and call accounting functions may be handled by the PMS 12 and CAS 14 without the need to invoke external devices outside the hotel premise network 10. In such a self-contained system, when a

336824-1

patron checks in, the patron's call account is typically
activated through a message exchange on serial link 20
connecting the PMS 12 and the PBX unit 18. When the patron
initiates and terminates a call, a call detail record (CDR)
including a calling extension, called number, and call duration
is typically transmitted over serial link 22 from the PBX unit
18 to the CAS 14. In response, the CAS 14 typically generates
call cost information and transmits the call cost information
on serial link 16 to the PMS 12 for billing to the patron's call
account. When the patron checks out, the patron's call account
is typically deactivated through a message exchange on serial
link 20, and the patron is billed for the completed calls and
other hotel charges.

Although such self-contained systems may offer many
benefits for single hotel sites, they are typically highly
inefficient for use by hotel chains. For example, making
changes to the system on a chain-wide basis, such as adding a
new billing parameter to the PMS 12, making a tariff change, or
incorporating a new telephone area code to the CAS 14, may
become laborious and time consuming since the changes must
generally be programmed individually at each hotel site. The
addition of a new hotel to a hotel chain is similarly laborious
since the property management and call accounting parameters
must generally be programmed at the new site from scratch.

Accordingly, there is a need for a new architecture for
property management and call accounting that is more efficient
than the conventional self-contained systems. While promoting
efficiency, the new architecture should be designed to protect
to the greatest extent possible existing investments in the
installed equipment at the hotel.

336824-1

2

SUMMARY OF THE INVENTION

The present invention is directed to a system and method for centralizing the property management and/or call accounting services through a network-based service provider. One of the benefits of the architecture described in the present invention allows hotels to migrate from existing premise-based systems for PMS and Call Accounting to a centralized system, without the need for replacing or modifying the existing PBX system at each hotel premise. Another benefit is that changes to call accounting and/or property management parameters may now be made from a centralized site instead of programming the changes individually at each hotel site.

According to one embodiment of the present invention, an internetwork for providing property management services preferably includes a client network and a service provider network. The client network preferably transmits to the service provider network a call parameter for a completed call. The service provider network preferably determines a cost for the completed call based on the call parameter and transmits the call cost information back to the client network to charge the cost to an account.

In another embodiment of the present invention, the internetwork preferably includes a plurality of client networks coupled to a service provider network over a wide area network. Ones of the client networks include ones of private branch exchanges, respectively, coupled to first ones of protocol converters, respectively, for exchanging data with the service provider network. The service provider network includes a call accounting system and a second protocol converter for exchanging data with ones of the client networks.

336824-1

In a further embodiment of the present invention, the internetwork preferably includes a client network that includes

5   a call management unit and a first protocol converter. The call management unit generates call parameter data for a completed call. The first protocol converter is coupled to the call management unit and converts between a first transmission format and a second transmission format. The internetwork preferably

10   further includes a service provider network including a call accounting system and a second protocol converter. The call accounting system receives the call parameter data and determines a cost for the completed call based on the call parameter data. The second protocol converter is coupled to the

15   call accounting system and converts between a third transmission format and a fourth transmission format. The internetwork also includes a wide area network electronically linking the client network to the service provider network for allowing

20   communication between the client network and the service provider network.

In yet another embodiment, the present invention includes a method for providing property management services in a system including a client network coupled to a service provider network

25   over a wide area network. The method preferably includes generating at the client network a call parameter for a completed call and transmitting to the service provider network the call parameter. Call cost information for the completed call is determined at the service provider network based on the

30   call parameter. The call cost information is transmitted back to the client network to charge the cost to an account.

It should be appreciated, therefore, that the centralization of property management services at the service

35   provider network promotes efficiencies not generally encountered

336824-1

in the conventional self-contained systems. The addition of new
hotel sites to a hotel chain should be less laborious under the
present invention since parameters for property management
and/or call accounting handled at the service provider network
need not be reprogrammed at the new site. Changes to these
parameters should also be more efficient. The changes need no
longer be individually programmed at each affected hotel site,
but may now be made at the single service provider network
providing the property management and/or call accounting
services for these hotel sites.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other features, aspects and advantages of the
present invention will be more fully understood when considered
with respect to the following detailed description, appended
claims, and accompanying drawings where:

FIG. 1 is a schematic block diagram of a hotel premise
network traditionally hosted by a hotel;

FIG. 2 is a schematic block diagram of an internetwork for
providing centralized property management services including
call accounting services according to one embodiment of the
invention;

FIGS. 3A-3B are flow diagrams for processing and billing
telephone call charges according to the embodiment illustrated
in FIG. 2;

FIG. 4 is a schematic block diagram of an internetwork for
providing centralized property management services including
call accounting services according to another embodiment of the
present invention;

336824-1

FIG. 5 is a schematic block diagram of an internetwork for providing centralized call accounting services according to a further embodiment of the present invention; and

FIG. 6 is a flow diagram for processing telephone call charges according to the embodiment illustrated in FIG. 5.

DETAILED DESCRIPTION

FIG. 2 is a schematic block diagram of an internetwork 100 for providing centralized property management services preferably to one or more hotel sites according to one embodiment of the present invention. The property management services may include the check-in, check-out, and billing of patrons of the hotels. Preferably, the property management services include the billing of telephone calls made by the patrons of the hotels. In other embodiments, the property management services may also include the accounting and billing of other services, such as fax services, other business services, minibar purchases, in-room internet access, housekeeping services, movie viewing, and/or other entertainment services.

The internetwork 100 preferably includes client networks 102, 104 and an application service provider (ASP) network 106. The client networks 102, 104 are preferably located at hotel sites remote from the ASP network 106. The ASP network 106 may be located at a central location, which for example, may be a hotel headquarters. The ASP network 106 may also be referred to as an ASP site or service provider network.

The client networks 102, 104 and ASP network 106 are preferably coupled to one another over computer networks 101 including but not limited to the public internet, a virtual private network (VPN), or a wide area network (WAN). The client

336824-1

networks 102 and 104 each preferably include a call management unit such as, for example, a private branch exchange (PBX) unit

5   110, 116, protocol converter 112, 118, and property management system (PMS) client 108, 120. The PBX units 110, 116 are preferably coupled to the protocol converters 112, 118 over serial links 130, 132, 134, 136. PBX units are well known by those skilled in the art, and may include circuitry and logic

10   for managing incoming and outgoing calls for their respective hotel sites. The PBX units 110, 116 preferably create and maintain a call detail record (CDR) including call parameters for each call sent and/or received at their respective client networks 102, 104 as is conventional in the art. The call

15   parameters preferably include a calling extension number, called number, call duration, and the like. The PBX units 110, 116 may further create and maintain information relating to other services. For instance, each time housekeeping services are

20   provided, a maid providing the services may enter a predetermined code in the hotel room's telephone set indicating that such service was provided. This information may then preferably transmitted through the PBX unit to the PMS system so that the clean/dirty status of the room can be determined by

25   hotel personnel.

The protocol converters 112, 118 are preferably serial-to-internet-protocol and/or internet-protocol-to-serial converters conventional in the art. The protocol converters 112, 118

30   preferably include network interfaces (not shown) for communicating over the computer networks 101. The communication is preferably carried out using a computer network protocol, such as, for example, the internet protocol (IP).

The PMS clients 108, 120 are preferably platform computers

35   or network servers also conventional in the art. The PMS

336824-1

7

clients 108, 120 preferably include a network interface (not shown) for communicating over the computer networks 101. The

5   communication is also preferably carried out using a computer network protocol, such as, for example, the internet protocol. The PMS clients 108, 120 further preferably include user interfaces such as, for example, keyboards, keypads, displays, and the like, for allowing interaction with a user of the

10 system.

The ASP network 106 preferably includes a property management system (PMS) server 126, a call accounting system (CAS) 124, and a protocol converter 122. The PMS server 126, CAS 124, and protocol converter 122 are preferably interlinked

15 to each other over serial links 138, 140, 142.

The protocol converter 122 is preferably a serial-to-IP and/or from IP-to-serial converter conventional in the art, and may be similar to the protocol converters 112, 118 at the client

20 networks 102, 104. The protocol converter 122 preferably includes a network interface (not shown) for communicating over the computer networks 101. The communication is preferably carried out using a computer network protocol, such as, for example, the internet protocol.

25 The CAS 124 is preferably a centralized CAS providing centralized call accounting services to the hotel sites associated with the client networks 102, 104. The CAS 124 may be similar to the CAS 14 of FIG. 1 traditionally used in the self-contained hotel networks, but preferably includes

30 additional functionalities and interfaces for communicating with the protocol converter 122 and providing centralized call accounting services to the various hotel sites.

The PMS server 126 is preferably a platform computer or

35 network server also conventional in the art. The PMS server 106

336824-1

8

preferably communicates with the PMS clients 102, 104 to provide centralized property management services to the hotel sites. The PMS server 106 also communicates with the PBX unit 110, 116 preferably using the PMS commands 128. The PMS commands may include commands for activating and/or deactivating long-distance call access for a particular patron.

It is to be understood that the client networks 102, 104 and the ASP network 106 may include other clients, servers, components, and/or functions that are not shown but are conventional in the art.

FIGS. 3A-3B are flow diagrams for processing and billing telephone call charges according to the embodiment illustrated in FIG. 2. The process starts, and in step 141, the PMS client 108, 120 determines if a patron has checked-in to the hotel. If the answer is YES, the patron's call account is activated in step 143 and the patron is given access for making long-distance phone calls. In this regard, the PMS client 108 transmits the check-in information to the PMS server 126 over the computer networks 101. Upon receipt of the check-in information, the PMS server 126 preferably creates an account for the patron and transmits a PMS command to the PBX unit 110, 116 to enable long-distance calls for the patron. The PMS command is preferably transmitted in serial format to the protocol converter 122 which converts it into a network format, such as, for example, an IP format, and transmits it over the computer networks 101. The protocol converter 112 at the client network 102, 104 reconverts the PMS command from the network format to the serial format, and transmits it to the PBX unit 110, 116.

In step 145, the PBX unit 110, 116 works with the PMS server 126 to monitor and update telephone charges and other charges/services associated with the patron. In step 147, the

336824-1

PMS client 108, 120 determines if the patron is to be checked-out of the hotel. If the answer is YES, the patron's call

5   account is de-activated in step 149 and long-distance calls are disabled for the patron. In this regard, the PMS client 108 transmits the check-out information to the PMS server 126 over the computer networks 101. Upon receipt of the check-out information, the PMS server 126 preferably de-activates the

10   patron's call account and transmits a PMS command to the PBX unit 110, 116 to disable long-distance calls for the patron. The PMS command is preferably transmitted in serial format to the protocol converter 122 which converts it into a network format, such as, for example, an IP format, and transmits it

15   over the computer networks 101. The protocol converter 112 at the client network 102, 104 reconverts the PMS command from the network format to the serial format, and transmits it to the PBX unit 110, 116.

20   In step 151, the PMS server 140 transmits the patron's call account information including information on the charged calls, to the PMS client 108, 120. This   information   is   also transmitted if the PMS client 108, 120 expressly requests the information from the PMS server 126 in step 157.

25   In step 153, the PMS client 108, 120 determines if the patron is to be billed for the charges. If the answer is YES, the PMS client 108, 120 proceeds to generate a bill in step 155 with the call account information received from the PMS server 126.

30   FIG. 3B is a more detailed flow diagram of the step 145 for updating telephone charges for a hotel patron according to one embodiment of the invention. In step 160, the PBX unit 110, 116 creates a CDR including various call parameters for a

35   particular telephone call initiated and completed by the patron

336824-1

at the hotel site according to conventional methods. The call parameters preferably include a calling extension number, called

5   number, call duration, and/or any other information associated with the call, caller, and/or callee. The PBX unit 110, 116 at the client network 102, 104 preferably transmits the CDR to the CAS 124 at the ASP site for centralized call accounting. In this regard, the protocol converter 112, 118 at the hotel site

10   in step 162, preferably protocol converts the CDR from a serial format into a network format, such as, for example, an IP format. In step 164, the protocol converter 112, 118 provides the converted CDR to the protocol converter 122 at the ASP site over the computer networks 101. The protocol converter 122 at

15   the ASP site reconverts the CDR into a serial format and transmits it to the CAS 124 over a serial link 138.

In step 166, the CAS 124 preferably calculates the cost of the call based on the CDR data. In step 168, the CAS 124

20   provides the call cost information to the PMS server 126 over serial link 140. Upon receipt of the call cost information, the PMS server 126 preferably adds the cost to the patron's call account in step 170.

FIG. 4 is a schematic block diagram of an internetwork 200

25   for providing centralized property management services including call accounting services according to another embodiment of the present invention. The internetwork 200 preferably includes client networks 202, 204 and an ASP network 206 which may be similar to the client networks 102, 104 and ASP network 106 of

30   FIG. 2. As in the client networks 102 and 104, the client networks 202 and 204 each preferably include a PBX unit 210, 216, protocol converter 212, 218, and PMS client 208, 220.

Furthermore, as in the ASP network 106 of FIG. 2, the ASP

35   network 206 of FIG. 4 preferably includes a PMS server 226, a

336824-1

11

CAS 224, and a protocol converter 222. In the embodiment
illustrated in FIG. 4, however, the PMS server 226 preferably

5   does not transmit and/or receive PMS commands serially via the
protocol converter 222. Instead, the PMS server 226 preferably
transmits and/or receives the PMS commands and other information
directly over computer networks 201 using a computer network
protocol, such as, for example the internet protocol. In an

10   alternative embodiment, the call accounting system 224 also
preferably transmits and/or receives information directly over
computer networks 201.

FIG. 5 is a schematic block diagram of an internetwork 300
for providing centralized call accounting services according to

15   a further embodiment of the present invention. According to
this embodiment, the call accounting service is preferably
provided from a central location while the property management
services preferably are not centralized, but provided

20   individually at each hotel site.

The internetwork 300 preferably includes client networks
302, 304 and a call accounting ASP network 306. The call
accounting ASP network 306 may also be referred to as an ASP
network, an ASP site, or a service provider network.

25   As in the client networks of the previous embodiments, the
client networks 302 and 304 each preferably include a PBX unit
308, 314 and protocol converter 310, 316 which may be similar
to the PBX units and protocol converters of the previous
embodiments. The client networks 302, 304, however, do not

30   include a PMS client. Instead, each client network 302, 304
includes a PMS 312, 318, which may be similar to the PMS 12 of
FIG. 1 traditionally used in the self-contained hotel networks.
The PMS 302, 304, however, may also include additional

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336824-1

functionalities and interfaces for communicating with the protocol converter 310, 316.

5   The call accounting ASP network 306 preferably includes a protocol converter 320 and a call accounting server 322. The protocol converter 320 may be similar to the protocol converters of the previous embodiments. The call accounting server 322 is preferably a platform computer or network server including the

10   functionalities of the CAS of the previous embodiments for providing centralized call accounting services for the hotel sites associated with the client networks 302, 304. The call accounting server 322 may also be referred to as a CAS.

15   FIG. 6 is a flow diagram for processing telephone call charges according to the embodiment illustrated in FIG. 5. The process starts, and in step 400, the PBX unit 308, 314 creates a CDR including various call parameters for a particular telephone call initiated and completed by a hotel patron at the

20   hotel site. The call parameters preferably include a calling extension number, called number, call duration, and/or any other information associated with the call, caller, and/or callee. In step 402, the PBX unit 308, 314 at the client network 302, 304 preferably transmits the CDR to the call accounting server 322

25   at the ASP site. In this regard, the protocol converter 310, 316 at the hotel site preferably protocol converts the CDR from serial format into a network format, such as, for example, an IP format, and provides the converted CDR to the protocol converter 320 at the ASP site over computer networks 301. The

30   protocol converter 320 at the ASP site reconverts the CDR into a serial format and transmits it to the CAS 324 over serial link 324. In an alternative embodiment, the CDR is transmitted directly to the call accounting server 322 in a network format bypassing the protocol converter 320.

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336824-1

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        In step 406, the call accounting server 322 preferably
calculates the cost of the call based on the CDR data. In step
5   408, the call accounting server 124 provides the call cost
information to the protocol converter 320 over serial link 326.
The protocol converter converts the call cost information from
a serial format into a network format, such as, for example, an
IP format. In step 410, the protocol converter 320 transmits
10 the call cost information to the protocol converter 310, 316 at
the hotel site over the computer networks 301. In an
alternative embodiment, the call cost information is transmitted
in a network format directly over the computer networks 301
bypassing the protocol converter 320.

15   In step 412, the protocol converter 310, 316 receives the
call cost information and reconverts it to a serial format. In
step 414, the protocol converter 310, 316 transmits the call
cost information to the PMS 312, 318 at the client network 302,
20 304 over serial links 328, 330. In step 416, the PMS 312, 318
receives the call cost information and bills the hotel patron's
call account according to conventional methods.

        Although this invention has been described in certain
specific embodiments, those skilled in the art will have no
25 difficulty devising variations which in no way depart from the
scope and spirit of the present invention. For example, the
client networks 102, 104, 202, 204, 302, 304 and the ASP
networks 106, 206, 306 may include other clients, servers, or
components for supporting the centralized billing and/or
30 accounting of other hotel services, such as, for example, fax
services, other business services, minibar charges, in-room
Internet access, housekeeping services, movie viewing charges,
and/or other entertainment services. Thus, in addition to a
35 call accounting system/server, an ASP network may include a fax

336824-1

accounting system/server, movie accounting system/server, or the
like.

5   It is therefore to be understood that this invention may
be practiced otherwise than is specifically described. Thus,
the present embodiments of the invention should be considered
in all respects as illustrative and not restrictive, the scope
of the invention to be indicated by the appended claims and
10 their equivalents rather than the foregoing description.

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336824-1